



EPA Region 7 TMDL Review

TMDL ID: **Waterbody ID(s):** 01-NMQ-0020_2
Waterbody Name(s): North Fork Maquoketa River
Tributary(ies): Coffee Creek
Pollutant(s): Sediment, Nutrients (phosphorus), and Ammonia
State: IA **HUC(s):** 07060006(03)
Basin: Maquoketa River
Submittal Date: January 11, 2007
Approved: Yes

Submittal Letter

State submittal letter indicates final Total Maximum Daily Load(s) (TMDL) for specific pollutant(s)/water(s) were adopted by the state, and submitted to EPA for approval under section 303(d) of the Clean Water Act [40 CFR § 130.7(c)(1)]. Include date submitted letter was received by EPA, date of receipt of any revisions, and the date of original approval if submittal is a phase II TMDL.

This TMDL was officially submitted by the State of Iowa in a letter dated January 8, 2007 and received by EPA on January 11, 2007.

Water Quality Standards Attainment

The water body's loading capacity (LC) for the applicable pollutant is identified and the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources is described. TMDL and associated allocations are set at levels adequate to result in attainment of applicable water quality standards (WQS) [40 CFR § 130.7(c)(1)].

The LC is set at; for sediment an annual load of 20,200 tons/yr (daily expression 11,700 tons/day corresponding to a 2 year recurrence 24 hour rainfall event load), total phosphorus (TP) 6.64 lbs/day, and ammonia 2.05 lbs/day (equal to 10 mg/L). These LCs are set to address likely causative parameters identified in the stressor identification framework undertaken for this water body. These targets are based on water quality standards and reference ranges found in the ecoregion. If these targets are met the water body characterization should meet water quality standards and aquatic life biological criteria.

WQS that apply to targets set in the TMDL include dissolved oxygen (DO) 5.0 mg/L or higher for 16 hours a day and 4.0 mg/L daily minimum.

Numeric Target(s)

Submittal describes applicable WQS, including beneficial uses, applicable numeric and/or narrative criteria. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.

The water body was listed as impaired based on biological indexes. The impaired use is aquatic life support, B(WW-2). The designated beneficial uses are aquatic life support, B(WW-2) and general use. Applicable water quality standards are DO (5.0 mg/L for 16 of 24 hours, minimum concentration 4.0 mg/L) and acute/chronic ammonia (numeric criterion varies with temperature and pH – a table is given in the text). Other WQS addressed are narrative. Targets to address these criteria are given in the paragraphs that follow.

The sediment targets are set to address excessive fine sediments. The annual target was determined using the Revised Universal Soil Loss Equation (RUSLE) and the daily target was determined using the Modified Universal Soil Loss Equation (MUSLE). The present load was calculated using the models and the targeted reduction was determined based on the percentage reduction required in the percent bottom siltation between the most down stream sampling site and the ecoregion reference value, this requires a 77% reduction in sediment load.

Nutrient targets are set to address the stressors of excessive algal growth and low DO identified in the stressor identification document. The targets applying to the individual stressors are; DO maximum 200% of saturation, maximum DO daily range 10 mg/L, one third reduction in benthic algae and plants, and the WQS for DO. Meeting these targets should result in BMII scores greater than 59 and a FIBI score greater than 43 in non-riffles and greater than 73 in riffles. Qual2K modeling was used to demonstrate the sensitivity of DO in the water body to algal growth. After the model was calibrated it was rerun with only TP reduced until the model met the algal and DO targets. This will result in a reduction of 14.4 lbs TP/day.

Ammonia targets were set to address the oxygen demand caused by ammonia and the toxicity of ammonia to the aquatic biota as identified in the stressor identification document. Qual2K modeling was used to calculate the maximum concentration for a 2-year return 24-hour rainfall runoff event that would result in the in-stream ammonia concentration to not exceed the WQS acute criterion of 1.32 mg/L (pH=9.0 and water temperature=20°C). The acute criterion was targeted due to the episodic nature of this event. Additionally, the oxygen demand of the ammonia load was shown to not cause an excursion of the DO WQS.

Pollutant(s) of concern

An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety (MOS) that do not exceed the LC. If submittal is a phase II TMDL there are refined relationships linking the load to WQS attainment. If there is an increase in the TMDL there is a refined relationship specified to validate the increase in TMDL (either load allocation (LA) or waste load allocation (WLA)). This section will compare and validate the change in targeted load between the versions.

The targeted pollutants have been identified through a stressor identification procedure. The links are both direct (ammonia and sediment) and established (TP). The weight of evidence from this procedure indicates sediment, nutrients, DO dynamics, and episodic slugs of ammonia are causing the biological impairment. These are being addressed through targeting sediment, TP, and ammonia slug loads. TP is being targeted to address the nutrient and dissolved oxygen components.

Source Analysis

Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, nonpoint and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered. If this is a phase II TMDL any new sources or removed sources will be specified and explained.

Present loading for sediment was calculated using the Revised Universal Soil Loss Equation (RUSLE) and the Modified Universal Soil Loss Equation (MUSLE). The sources for sediment in the watershed are identified as sheet and rill erosion from agricultural land, stream banks and gully erosion. No point sources of sediment were identified as significant in the watershed.

Nutrient sources, TP, are mostly nonpoint derived. During the critical period of low summer flows, only the New Vienna WWTP (IA0027391) discharges to the segment. Nonpoint sources are identified as runoff from watershed land uses, open feedlots, septic tanks, wildlife and pet feces. The loads were estimated using EPA and WILMS export loading coefficients for land uses. The two largest sources identified by these procedures were runoff from row crops and feedlots. The New Vienna WWTP load was estimated based on population served and estimates of per capita TP and design flow with no TP removal in the treatment process. This estimate is 6% of the total watershed load and the TMDL calls for monitoring to determine the actual load as well as assigning a WLA to the facility.

Ammonia sources causing impairment are identified as slugs associated with surface runoff and fertilizer spills. There are at least 66 open feed lots in the watershed from which these loads can originate. Point sources are not significant sources of episodic ammonia loads.

Background sources are not separated for the targeted pollutants. It seems all sources have been identified.

Allocation - Loading Capacity

Submittal identifies appropriate WLA for point, and load allocations for nonpoint sources. If no point sources are present the WLA is stated as zero. If no nonpoint sources are present, the LA is stated as zero [40 CFR § 130.2(i)]. If this is a phase II TMDL the change in LC will be documented in this section.

Load capacities are given for sediment, TP, and ammonia (episodic) to result in the attainment of biological indices scores which indicate aquatic life support B(WW-2) is met.

WLA Comment

Submittal lists individual WLAs for each identified point source [40 CFR § 130.2(h)]. If a WLA is not assigned it must be shown that the discharge does not cause or contribute to WQS excursions, the source is contained in a general permit addressed by the TMDL, or extenuating circumstances exist which prevent assignment of individual WLAs. Any such exceptions must be explained to a satisfactory degree. If a WLA of zero is assigned to any facility it must be stated as such [40 CFR § 130.2(i)]. If this is a phase II TMDL any differences in phase I and phase II WLAs will be documented in this section.

WLA sediment not significant, no WLA assigned. WLA TP assigned to New Vienna WWTP (IA0027391) of 1.24 lb/day and a requirement to monitor TP in their effluent. Other point sources in the watershed are shown to not have a significant effect and so no WLA is assigned. WLA episodic ammonia load (acute) is not significant and no WLA is assigned.

LA Comment

Includes all nonpoint sources loads, natural background, and potential for future growth. If no nonpoint sources are identified the LA must be given as zero [40 CFR § 130.2(g)]. If this is a phase II TMDL any differences in phase I and phase II LAs will be documented in this section.

LA for sediment is 20,200 tons/year (11,700 tons/day for 2-year/24-hour rainfall event). LA for TP is 5.40 lbs/day. LA for episodic ammonia load (acute) is 1.92 lbs/day.

Margin of Safety

Submittal describes explicit and/or implicit MOS for each pollutant [40 CFR § 130.7(c)(1)]. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided. If this is a phase II TMDL any differences in MOS will be documented in this section.

MOS for sediment are conservative assumptions (implicit) targeting the median reference condition which is well below the 75th percentile, the upper limit for reference streams meeting the biological targets. MOS for TP is implicit, the loads are calculated to achieve DO and algal conditions 10% below targets. MOS for ammonia is explicit in that the LC results in a concentration 10% lower than the target.

Seasonal Variation and Critical Conditions

Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s) [40 CFR § 130.7(c)(1)]. Critical conditions are factors such as flow or temperature which may lead to the excursion of WQS. If this is a phase II TMDL any differences in conditions will be documented in this section.

Sediment targets are accounted for as yearly load and design rainfall event load to account for erosion across the climatic range. TP targets are based on loads during critical periods of late summer to address DO dynamics based on algal growth. Ammonia targets are set to address episodic loads which have a direct toxicity as well as an impact on DO dynamics.

Public Participation

Submittal describes required public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s) [40 CFR § 130.7(c)(1)(ii)].

Public participation included a meeting in New Vienna on May 18, 2005. A second meeting was held December 4, 2006 to present the draft TMDL to stakeholders. Comments were incorporated into the submittal where appropriate. Copies of comments from Darcy Kiel and the Iowa Farm Bureau were included with the submittal. EPA feels the IDNR response to comments adequately addresses the concerns raised.

Additionally the TMDL was posted on the Iowa DNR web site.

Monitoring Plan for TMDL(s) Under Phased Approach

The TMDL identifies a monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used) [40 CFR § 130.7].

There is an ongoing assessment of a watershed plan. There is also existing ambient monitoring by Iowa Department of Natural Resources. The submittal acknowledges that it is a first phase TMDL which requires monitoring to evaluate the effectiveness of the targets identified in the TMDL.

Reasonable assurance

Reasonable assurance only applies when less stringent WLAs are assigned based on the assumption of nonpoint source reductions in the LA will be met [40 CFR § 130.2(i)]. This section can also contain statements made by the state concerning the state's authority to control pollutant loads.

Reasonable assurances are not required for nonpoint source loads. The New Vienna WWTP is given a WLA based on an estimate of current load. This accounts for only 6% of the TP load to the impaired stream. Other point sources do not discharge at periods of low flow which have been targeted to address nutrient impacts on DO dynamics and algal growth.